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Lubrication

A Technical Publication Devoted to the Selection and Use of Lubricants

THIS ISSUE

Chassis Lubrication
and
Lubricators

PUBLISHED MONTHLY BY
THE TEXAS COMPANY, U.S.A.
TEXACO PETROLEUM PRODUCTS

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when your motor vehicle is
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Wherein gears continually mesh with that noiseless perfection intended by the designer, due to the protective characteristics of **Texaco Thuban Compound**, the extent to which it adheres to the teeth, and the fact that it is 100% mineral oil, therefore 100% lubricant.

Gear shifting becomes a pleasure when Thuban Compound fills your transmission.

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Free from rattles and squeaks because Texaco Chassis Lubricant, Texaco Marfak Grease and Texaco Motor Oil Extra Heavy "stay put." Where grease lubrication is intended the two former products function admirably in practically any form of pressure grease lubricator.

Texaco Chassis Lubricant is admirable for spring shackle bolts, steering mechanisms, brake parts, etc. It penetrates effectively to the innermost wearing elements and does not leak or drip prematurely from bearings, nor does it have any tendency to separate and leave the bearing clearances full of non-lubricating, gummy deposits.

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Texaco Motor Oil Extra Heavy, in turn, is an all-year-round lubricant for use where centralized pressure oiling is provided for. With its zero pour test it functions effectively even in the furthermost drip plug or lubricator without congealment during the coldest weather. Likewise its relatively high viscosity insures that it will remain in bearing clearance spaces satisfactorily, prevent the entry of dust, dirt and water, and resist any thinning out due to abnormal rises in temperature.

THE TEXAS COMPANY, U. S. A.

Texaco Petroleum Products

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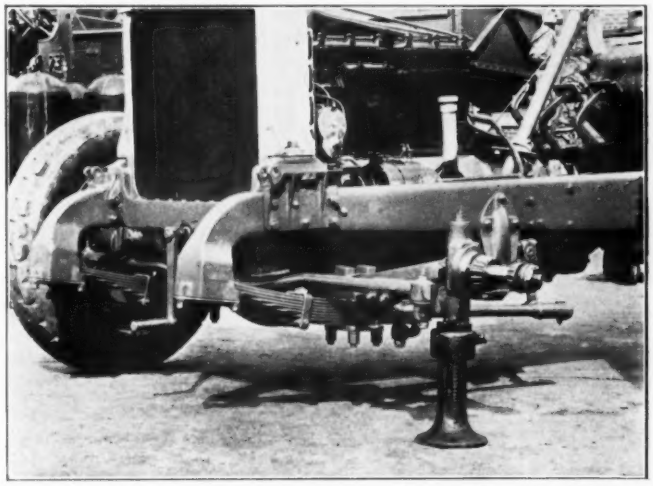


Courtesy of International Motor Co.

Fig. 1—Front axle view of a motor truck showing wheel bearings, and rubber block attachments which are used in place of spring shackle bolts.

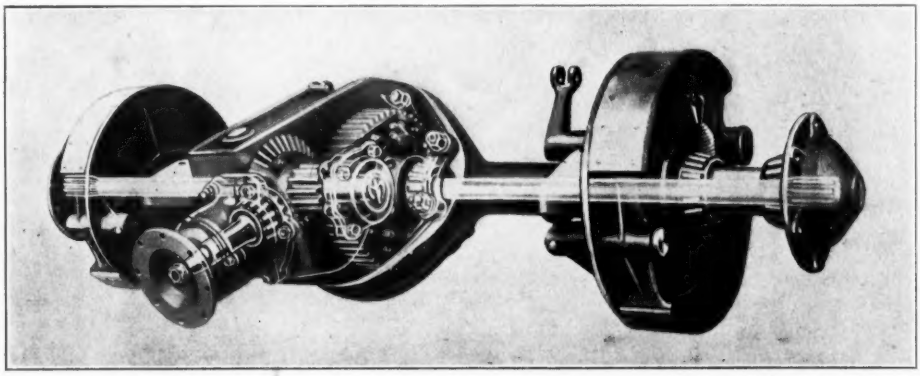
Chassis Lubrication and Lubricators

THE automotive vehicle today is perhaps the outstanding mechanical achievement of the twentieth century, from the viewpoint of service which it renders to mankind. As an assemblage of intricate mechanisms, of elements involving friction, of parts requiring intelligent care and attention, it ranks second to none. Yet, from the viewpoint of wear and tear, it is subject to probably more abuse than even the most rugged machine in modern industry.

This is probably due to the more or less prevalent tendency of so many motor car operators to require but one or two years from their cars, thus encouraging neglect in regard to many details of upkeep and maintenance. Too many of us are of the opinion that if the engine is periodically supplied with oil, and the transmission and differential gear cases packed with lubricant when some garageman may chance to suggest it, our duty towards our car is amply done.

The chassis, comprising those essential parts on which the car actually rides frequently is overlooked. The result is that wheel bearings, spring shackle bolts, steering mechanisms and perhaps the universal joints may run for thousands of miles without attention, without our realization that while the engine, transmission and differential may bring about motion, these other parts actually enable the efficient direction of such motion according to our desires or necessities.

Improperly lubricated chassis parts may involve more potential difficulties than an inefficient engine or set of gears. Failure of either of the latter usually means but inconvenience; failure of the former, such as for example our steering mechanisms, may often actually involve personal hazards. This is more especially true because such parts usually fail at the occasion of some abnormal strain or shock, arising when a car is driven under severe or unusual conditions. This element of danger, therefore, requires more careful attention to lubrication of chassis parts, for lubrication is our only actual means of insurance against wear and possible failure.



Courtesy of International Motor Co.

Fig. 2—Phantom view of a motor truck rear axle. Note gear arrangements, rear wheel bearings and brake construction. Provision is made to locate all parts requiring lubrication in as oil-tight cases as possible.

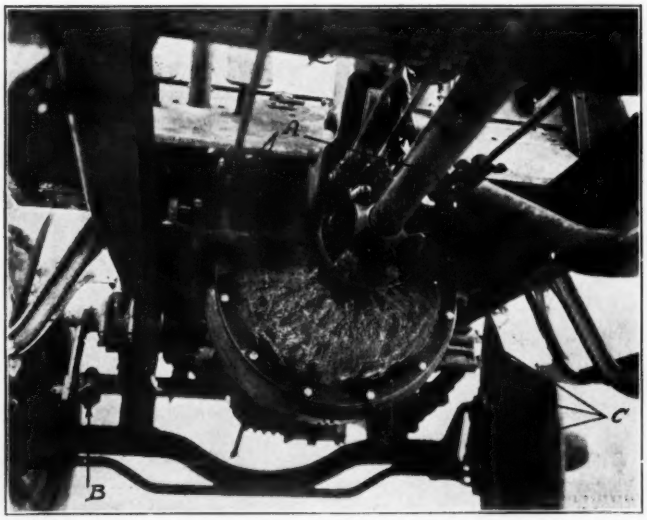


Fig. 3—Under view of a motor truck. A, B and C indicate chassis parts such as shackle bolts, steering gear connections and brake parts which require careful lubrication, due to possibility of entry of foreign matter.

In order to best understand the essentials of chassis lubrication, an insight into the various means whereby this is brought about will be beneficial. Broadly speaking of course, these are of two classes, i. e., dependent on whether they supply oil or grease. Both types of lubricants have their advantages and disadvantages, according to the means employed for their application. In any properly designed device adaptable to their characteristics both will serve to lubricate in an entirely satisfactory manner. Used in equipment unsuited to their requirements, however, as for example were we to attempt to lubricate with grease in a wick oiler, would naturally result in imperfect or even total lack of lubrication. So this matter requires the most careful consideration of the means of lubrication installed on the chassis parts of any motor vehicle.

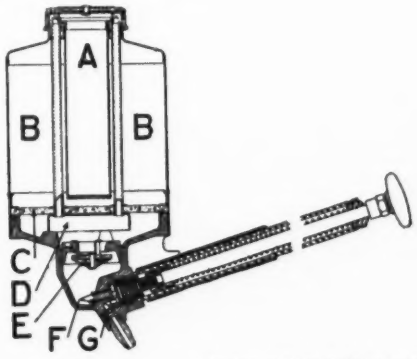
THE BENEFITS OF PROPER CHASSIS LUBRICATION

In order to appreciate the benefits directly attainable by proper attention to chassis lubrication, a brief discussion of certain of the more important parts will be of interest.

Steering Mechanisms

Here we will have to deal with knuckles, rods and the worm reduction gearing. Careful attention to the lubrication of rods and knuckles with the proper grade of oil or grease, according to the type of lubricating system, will make the car steer far more easily, promote more comfortable riding, and render driving a far less tiring task to the operator. Likewise the lubrication of the steering worm with the right grade of grease or gear lubricant will do away with that

"stiff" movement of the wheel, reduce the occurrence of play and give far better control, enabling holes in the road to be dodged more easily without wobbly front wheels to jar both your car and your nerves.



Courtesy of Bijur Lubricating Corp.

Fig. 4—Oil reservoir and pump of a centralized oiling system. A is the gauze strainer; B, the tank proper; C, a dense felt filtering diaphragm; D, the lower reservoir; E, a check valve; F, the holes leading to base of pump cylinder; and G, the outlet to the chassis oil line.

The Universal Joints

The purpose of these parts is to enable the transmission of motion from the engine and transmission to the rear end drive, with the least amount of lost motion or development of friction between the propeller shaft and its bearings. Universal joints must have as little play as possible for this will lead directly to loss of motion and power, cause jerky action of the car and impose undue pressure on transmission and differential gear teeth.

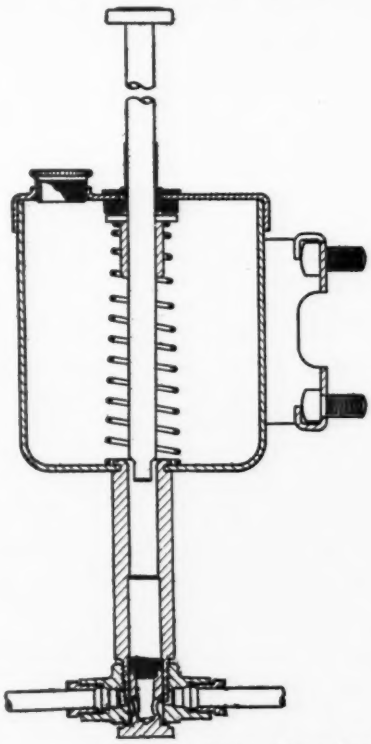
Such parts must, therefore, be carefully lubricated. Among the chassis parts the universal joints involve one of the several lubricating problems, due to the potential speeds which may be involved. The resultant centrifugal force tends to throw off the lubricant from the cross pin bearings, perhaps to involve loss or waste of the product, or at least the possibility of insufficient lubrication. Elbow fittings for application of grease are claimed to reduce this tendency of certain lubricants to throw off.

On starting there is also the possibility of development of abnormal pressure; this may cause light greases to be forced out through the sealing cap or grease retainer. For this reason the utmost care must be observed in selecting a lubricant of sufficient body and adhesive characteristics to resist this action as far as possible. A soap thickened residual petroleum product has been found to meet this requirement most effectively.

Brake Connections

Involving perhaps more simple mechanisms than many other chassis parts, mechanical brake connections, such as hanger bearings, etc., on the other hand are among the most important operating parts on the average automotive vehicle. The potential hazards that may accrue in the event of broken brake connections or brakes which do not function instantaneously or release promptly are so serious that every effort should be made to protect them effectively by proper lubrication.

In most cases brake connections are exposed to more or less dust and the effects of the weather. There will, therefore, be considerable likelihood of rusting and abnormal wear occurring if they are not kept supplied with adequate oil or grease, which has sufficient adhesive ability to "stay put" and not drip or throw off. Pressure lubrication is a most effective method of protecting brake cams and hanger bearings and preventing the entry of water, dust and dirt. It is important to remember that worn or corroded brake hanger bearings are a prevalent cause of premature wear of brake bands.



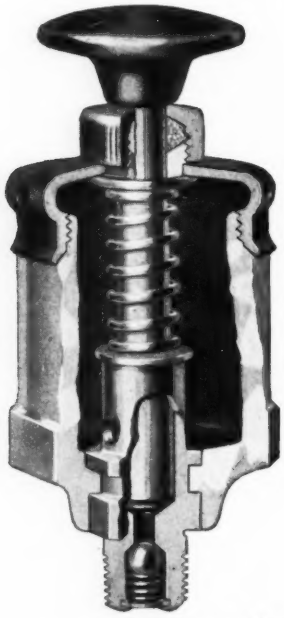
Courtesy of Bowen Products Corp.

Fig. 5—Sectional view of another type of oil reservoir and pump employed in centralized chassis lubrication. Pushing the plunger, which is normally maintained as shown by means of a spring and stop-collar, forces oil into the cylinder below and to the system via suitable outlets and valves.

Springs

The essential points of such springs on automotive vehicles, which will require lubrication are the shackle pin or bolt bearings. The purpose of springs is twofold: to improve the riding

qualities and comfort of the car, and to eliminate shocks as far as possible, which would otherwise rack the body and cause more or less rapid deterioration. Certain builders make use of a rubber pad or connection to eliminate the necessity for shackle connections and consequently lubrication at these points. The majority of cars, however, still use the typical shackle pin or bolt connection to take care of the play which occurs between the upper and lower springs.



Courtesy of Madison-Kipp Corp.

Fig. 6—Interior view of a pressure oiling lubricator designed for individual application to chassis parts. Here is combined an oil reservoir with a spring operated plunger pump. To supply a bearing with a "shot" of oil, the plunger handle is pulled out and released, forcing oil into the bearing under considerable pressure.

Spring connections by reason of the fact that they are frequently lubricated while carrying the weight of the car body may not receive oil or grease throughout their bearing surfaces. This is especially true where compression or screw-down grease cups are employed.

Axle Bearings

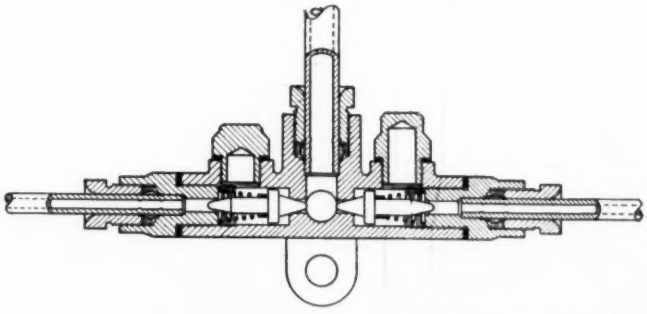
Operating conditions of front and rear wheel axle bearings are to a certain extent akin to those of universal joints. That is, centrifugal force will tend to throw the lubricant away from the essential wearing points, to frequently result in abnormal wear. This will be indicated by wobbling and difficult steering of front wheels, by wear on differential gear teeth in the rear end and by undue wearing of both front and rear tire treads.

The prevalence of four wheel brakes also renders the matter of heat generated more of a problem than where it has only to be counteracted on rear wheel bearings. Heat will be especially prevalent where braking is necessary to any extent. To meet this possibility as well as to effectively resist the action of centrifugal force, the same lubricant as designed for universal joints should be employed. This product, as mentioned above, by virtue of the high viscosity of its mineral oil content meets requirements very satisfactorily.

Furthermore, in cold weather, it has an admirable characteristic in that it does not solidify or congeal at low temperatures, and is, therefore, capable of performing its intended function, even though it may probably become somewhat more inert. As a general rule, filling of the hub caps will insure an adequate supply for several hundred miles of operation, although certain bus builders recommend filling daily at the time of general daily chassis lubrication.

OIL LUBRICATION

The use of fluid oil as a medium of chassis lubrication is today practically confined to the wick feed or magazine type of oiler or some form of manifold pressure lubricator. The practice of equipping cars or trucks with provisions for hand oiling has become practically obsolete. Such a procedure was never entirely satisfactory, for to cover a car properly with an oil can meant a tedious and frequently dirty job. No wonder, therefore, that so many of us have been prone to neglect at least those parts which were more difficult to reach.



Courtesy of Bowen Products Corp.

Fig. 7—Section of oil control header as used with the pump shown in fig. 5. Every time the pump plunger is depressed, a measured quantity of oil, according to the capacity of the vertical air chambers, is drawn in and subsequently delivered to the respective bearings.

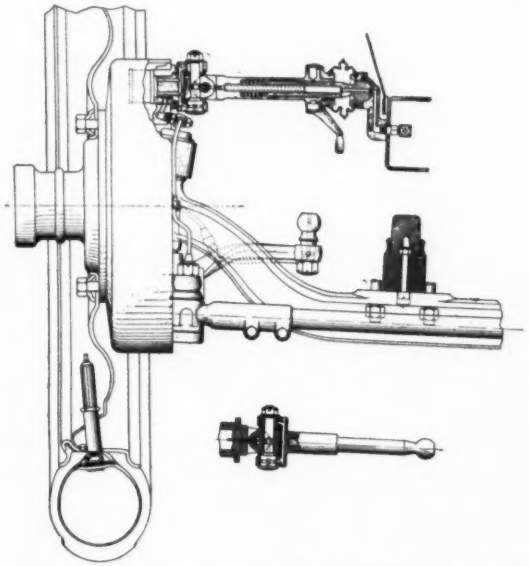
Today, however, automotive vehicle chassis lubrication has been so developed that whatever the system may be, it insures practically

automatic lubrication just so long as the lubricator contains sufficient oil or grease to pass to the wearing elements.

Centralized Pressure Lubrication

One of the interesting departures from the heretofore accepted idea of unit lubrication of each part separately, has been the development of a system of automatic lubrication which functions by virtue of a central control, all chassis parts being flushed and supplied automatically with oil from a central reservoir. By locating this latter beneath the floor boards, or in back of the dash, adjacent to the drivers' hand or foot, and equipping it with a suitable plunger or button which operates the pump, lubrication of all parts connected thereto becomes but a matter of pressing the button or pulling the plunger several times whenever necessary or recommended by the builders. Once a day is the usual procedure.

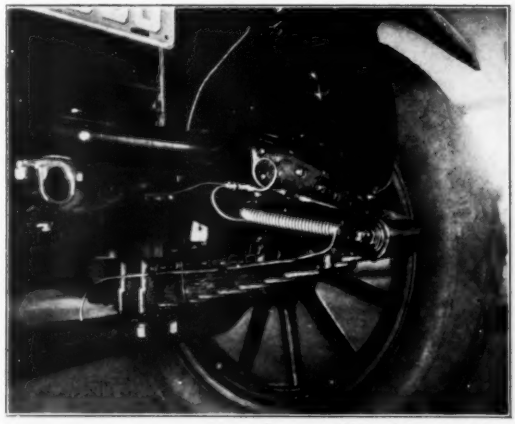
The fact that certain chassis parts will vary from others in regard to their oil requirements renders it necessary to provide for some arrangement of regulation or control of oil flow. Practically this amounts to a metering of the oil in terms of drops. It can be brought about either by proper individual construction of the drip plugs, which in this case are also known as control outlets; by use of a control device located at the base of the pump; or by the installation of suitable adjusting manifolds at salient points in the system.



Courtesy of Bijur Lubricating Corp.

Fig. 8—Front brake and steering connection equipped for oil lubrication from a centralized pressure system. Oil is fed from a drip-plug on the side frame, thence to the brake connections and steering gear parts via suitable leads and outlets.

Properly installed, such systems are relatively fool-proof, exceedingly simple to operate, and an insurance that clean oil will be delivered to the respective bearings. It is essential, however, that all parts be of rigid construction and capable of withstanding jars, shocks, and temperature fluctuations, for while all piping, etc., is concealed wherever possible within the chassis frame, it is relatively impossible to absolutely protect all parts from the chance of contact with stones, etc.



Courtesy of Bijur Lubricating Corp.

Fig. 9—Photo of front axle of a motor car showing means of transferring oil (in a centralized pressure system) to front axle parts by means of a coiled spring bridge.

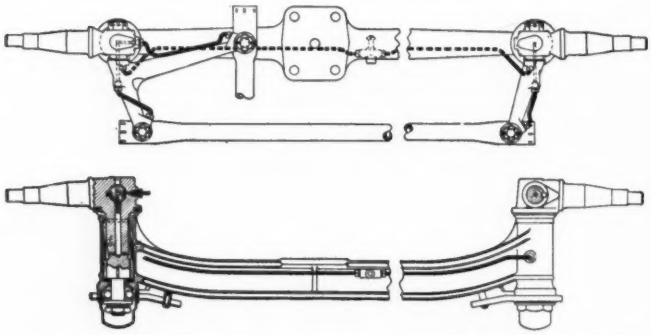
It is interesting to note that the possibility of entry of road dust into such a system is quite as negligible as in a pressure grease lubricator. To further insure that clean oil is used, however, certain central oil reservoirs are equipped with suitable filtering media such as a felt pad, which is claimed to effectively remove any foreign matter that may have entered the oil in the course of storage or handling in the garage. Motor oils as received from, or delivered by reputable oil refiners, can be relied upon as being free from foreign matter.

Oil lubrication of chassis parts by such a system of centralized control is claimed to materially simplify the problem of preservation of such bearings, from the viewpoint of the motor car owner or driver. The essential claims advanced for this system are well brought out in a recent paper presented before the Society of Automotive Engineers entitled "Chassis Lubrication" by Fred H. Gleason. In brief he concludes:

1. A simple, dependable chassis-lubrication system that will lubricate all chassis bearings efficiently can be incorporated in the

chassis with few complications and very little added expense.

2. Longer life, the elimination of annoying squeaks and rattles, and improved riding and handling qualities will result from the adoption of this system.

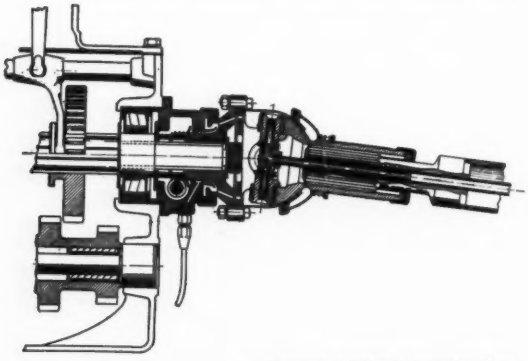


Courtesy of Bowen Products Corp.

Fig. 10—Front and top views of a front axle layout showing necessary piping involved in a centralized oiling system, location of outlets or plugs and paths of oil to steering gear wearing elements.

3. The reservoir and the pump constitute a sturdy unit that will function during the life of the chassis with no attention other than that required for filling the reservoir and occasionally cleansing the screen in the reservoir.

4. The system of oil-delivery control is such that $\frac{1}{3}$ cu. in. of oil will lubricate the bearings of the average chassis efficiently, so that every bearing surface will show a film of oil. Lubricant is not forced out around the outlets to soil the chassis and collect dirt. Any predetermined volume of oil, from one drop to any desired volume, is delivered positively at each outlet every time the pump plunger is depressed.



Courtesy of Bijur Lubricating Corp.

Fig. 11—Showing a method of lubricating universal joints by means of oil under pressure. Note drip-plug at lower rear of transmission, whereby oil is admitted to the joint through an annular lip and trough. The rear universal receives part of this oil by gravity through an internal tube, when the front joint is stationary in the above position.

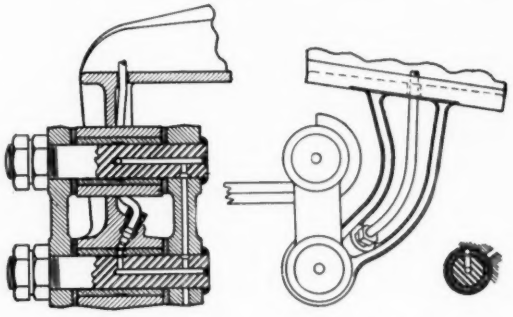
5. The system of oil delivery provides for a shot of oil at each bearing immediately after the pump plunger is operated and for a continuous, slowly decreasing feed for several hours.

6. The oil pressures developed at the outlets with one stroke of the pump plunger vary from 1 to 10 lbs. per sq. in., depending on the volume of oil delivered and the fit of the bearing supplied.

7. Failure in one or in any number of delivery lines will not affect the operation of the remaining delivery-lines.

8. The system will lubricate efficiently a chassis operated at sustained low temperatures.

9. The constructions employed to lubricate various chassis units provide means to lubricate these units with adequately protected tubes and connections that move as a rigid part with the unit, thus eliminating swivel connections and projecting parts that are subject to damage. Once properly installed, they will function during the life of the chassis.



Courtesy of Bowen Products Corp.

Fig. 12—Sectional view of oil lubricated spring shackle bolts showing piping from central reservoir, connection to bolt, and oil-ways drilled for passage of oil from one bolt to the other.

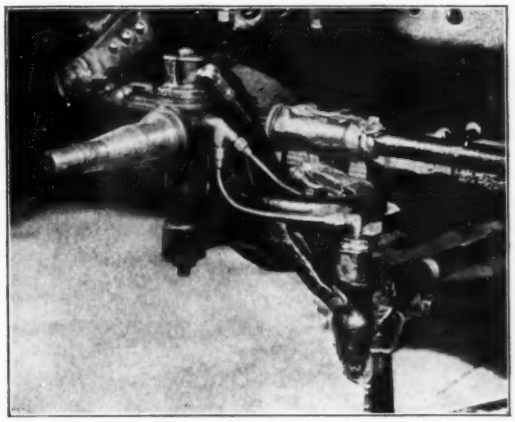
10. In general, all service-work on the chassis can be accomplished without disturbing the connections or the tubes of the lubrication systems.

Wick Oiling Lubricators

For the lubrication of spring shackle bolts, brake rocker shafts, fan bearings, steering pivots, clutch release bearings, etc., oil lubrication by means of the magazine oiler, for example, is also one of the proven methods of insuring such parts against wear, corrosion and the entry of dust. This device holds enough oil for about 5000 miles of operation. The

essential principle of such lubricators is that of wick feed lubrication, oil being carried from a magazine or oil reservoir by virtue of the capillary action of a suitable wick.

In the so-called magazine oiler, one end of this wick is submerged in the oil reservoir; the other passing through an aperture in the attachment bolt of the lubricator, in sufficient length to permit of insertion within the drilled-out oiling passage-way in the axis of the shackle bolt, for example. Within the latter, a similar passageway drilled radially downward at right angles to the axis connecting with the wick or oiling passage permits of oil delivery to the exterior surface of the bolt and the inner bearing surface of the spring shackle. This is the usual construction of the average shackle bolt, therefore, if the radial hole slopes downward no structural change or alteration of equipment is necessary, when a magazine wick oiler is to



Courtesy of Bijur Lubricating Corp.

Fig. 13—Front axle showing method of distributing oil in a pressure lubricating system to steering connections and knuckle without using swivels.

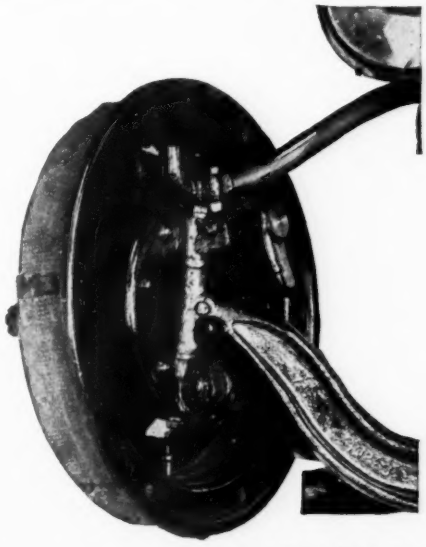
be substituted for any other type of individual lubricating device.

Steering pivots can, in turn, be also automatically lubricated, one magazine oiler being fastened to the upper boss feeding the upper and lower bushings and the thrust bearing. Brake rocker shafts, fan shafts, etc., can be likewise served.

Another interesting example of the application of wick feed oiling is that designed for the lubrication of certain steering mechanism drag links. Here the latter are so arranged that they can be filled with oil, this latter being fed by suitable wicks through the ball sockets to the ball connections at either end of the link.

The individual oil cup is also adaptable to service as a wick feed lubricator, as shown in the accompanying illustration. However, whereas capillary action is involved in the magazine or drag link oiler, the wick feed oil cup requires both capillary attraction and the action of the siphon in the transmission of oil from the reservoir to the wearing parts.

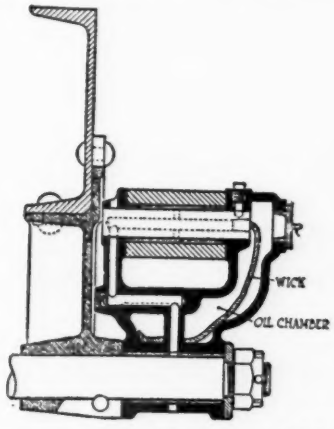
Capillary attraction alone is perhaps the more simple and economic, up-feed lubrication



Courtesy of Chassis Lubricating Co., Inc.

Fig. 14—A wick oiler of the magazine type lubricating the king-pin of a modern motor car.

in general being absolutely automatic, starting and stopping according to the relative motion of the wearing parts. There is, therefore, no



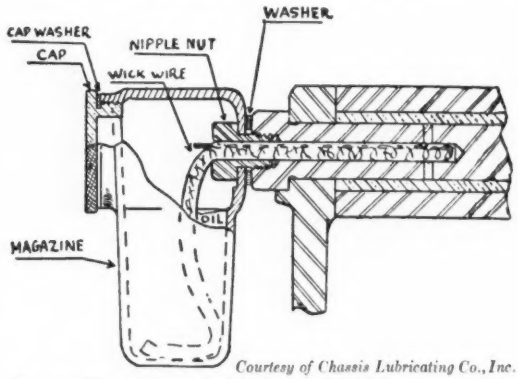
Courtesy of Chassis Lubricating Co., Inc.

Fig. 15—Showing the details of a magazine type wick oiler serving a shackle and shackle bracket.

chance of wasted oil during period of idleness or cessation of rubbing action between these parts.

Where a combination of capillary plus siphonic action is involved, in other words where oil feed is upward and then downward,

in many cases oil will continue to pass through the wick just as long as there is any left in the reservoir. In industrial or marine types of wick oilers involving this principle of operation it is

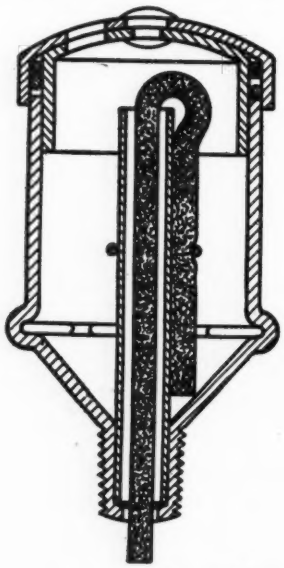


Courtesy of Chassis Lubricating Co., Inc.

Fig. 16—Constructional details of a typical wick oiling magazine lubricator showing method of attachment and relative position of the wick.

possible to remove the wicks during periods of idleness, thus insuring against oil wastage and sloppiness. In automotive service, however, such a procedure would be relatively impracticable. Wick oilers involving siphonic action to any extent should, therefore, be carefully chosen for use on any automotive vehicle.

With any wick oiling system, however, it is well to remember that it will tend to become



Courtesy of Bowen Products Corp.

Fig. 17—Sectional view of a wick oiling cup wherein the principles of both capillary and siphonic action are involved.

inoperative at such temperatures as may cause congealment of the oil. In cold weather, therefore, it is important to use oils which remain fluid at all temperatures likely to be encountered. The fact that the wick automatically serves as a very excellent filtering medium renders it possible in many cases to use discarded lubricating oil from the engine. The presence of a certain amount of gasoline in the average used oil will tend to lower the pour test from what it was in the original oil.

This matter of the wick serving as a filter is interesting in that it is more or less of an assurance that over the so-called life of the wick, clean oil will be delivered to the bearings, and water and dirt excluded. We must remember, however, that as the pores become more and more filled with foreign matter, a certain

Courtesy of Chas. P. Rogers & Co., Inc.

Fig. 18—A high pressure grease gun which is claimed to be capable of forcing grease into bearings under pressures up to 14,000 pounds. It is provided with an automatic feed and an air-check valve which eliminates air pockets.

reduction in capillarity will occur. Wicks should, therefore, be cleaned about once a year to keep them in condition for most effective operation and protection of all bearings involved.

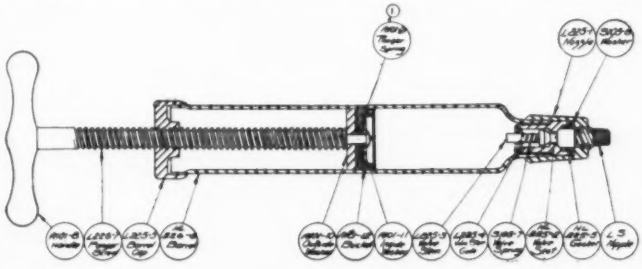
GREASE LUBRICATION

Notwithstanding the fact that fluid oil as a means of chassis lubrication is coming into considerable favor in connection with the systems of lubrication already explained, grease

still retains its predominating position as the lubricant preferred by the majority of builders and probably many operators, who desire tangible evidence that the respective parts of their chassis are receiving lubrication.

Application of oil by wick or pressure lubrication is more or less a question of having confidence in the lubricator. Whatever its type, it is to an extent guaranteed by the builders that it will furnish the requisite amount of oil to the respective bearings to keep them properly lubricated. In general, so little of this oil will work its way out at the bearing ends that visible evidence of lubrication may be negligible in certain cases.

With grease, on the other hand, recharging of bearings by means of pressure, be it in the form of a compression cup or a high pressure pump or gun, is to a large extent controlled or regulated by the outflow of lubricant from the ends of the bearings. In other words, grease is forced through the clearance spaces and bearing grooves (if any are provided) until a fresh film or emission appears at the furthermost exterior parts of the bearings. On the average chassis part, this is possible due to the fact that the steering gear bearings, spring shackle bolts, etc., are not of oil tight construction in the true sense of the word. Not only does such a condition facilitate the matter of grease lubrication by telling us when our bearings have had enough, but also it enables the ready forcing out of deteriorated, contaminated or gummed grease, which otherwise would be a decided hindrance to effective lubrication. This is, in fact, one of the essential advantages of grease lubrication by means of pressure lubricators.



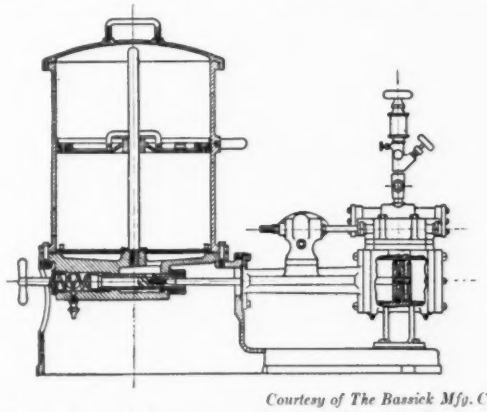
Courtesy of Carr Fastener Co.

Fig. 19—Details of a hand pressure grease gun showing relation of component parts. This is an especially adaptable lubricator for the average individual motor car owner.

Pressure Lubrication

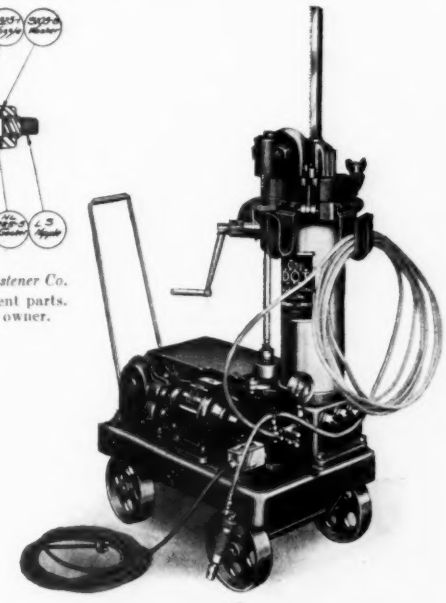
The modern automotive vehicle, which is designed for grease lubrication of chassis parts, is very largely equipped with suitable fittings to enable the use of some form of pressure lubricator or grease gun. Such devices are claimed to materially simplify and facilitate the matter of chassis lubrication, in a cleanly, expedient manner.

For this purpose lubricators of both the mechanical and air pressure type are used. For the handling of products, such as lighter greases, the hand or mechanical pressure gun, or the garage lubricator, which is operated by hand or foot pressure, is in general perfectly satisfactory. Considerable study and research has, however, been given to this matter of pressure grease lubrication of late, and a product has been developed which, by virtue of its lubricating characteristics and the nature of its soap content, is markedly superior to the heretofore accepted cup grease.



Courtesy of The Bassick Mfg. Co.

Fig. 20—Sectional view of a power lubricator for the application of grease under pressure to chassis parts. Compressed air is used for operation of this device.



Courtesy of Carr Fastener Co.

Fig. 21—An electric power grease compressor or lubricator adjustable to any pressure up to 2500 lbs. per square inch. This is an especially adaptable unit for rapid lubrication of chassis parts in the garage of a fleet of trucks or buses.

The essential properties of such a grease are that it is soft, pliable and plastic, yet with decided non-fluid tendencies. That it is able to form and maintain its own housing and capable of "training," or adhering both to wearing surfaces as well as itself in much the same way that bread dough adheres and yet "strings out."

Courtesy of Industrial Oil Equipment Co.

Fig. 22—Another type of hand-pressure greasing device,—the "gun-fil", serving in this instance the king pin of a motor car. This lubricator is suited to standard pressure guns of the Dot, Alemite, and Zerk, etc., types. A feature is the possibility of reservoir feed, where continuous operation is necessary, with reduction in the frequency of re-filling. There is a suitable indicator attached to show when a fresh supply of lubricant is necessary.

It is furthermore resistant to heat and to centrifugal force, yet it has no tendency to separate or break up even under the hardest kind of rough treatment.

It is equally as capable of lubricating the ball bearings of a motor bus generator or motor as it is the roller bearings of front and rear wheels or the mechanisms of a universal joint. It is capable also of application by means of pressure lubricators or by hand; it does not drip or flow under high temperatures and it contains an oil of maximum lubricating quality, with the result that it is economical and capable of giving service for extensive periods of operation.

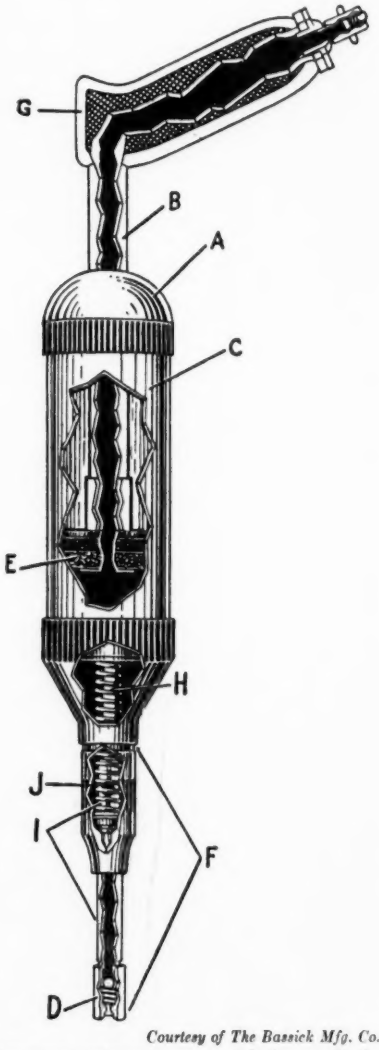
Such a product has proven to be eminently satisfactory and readily handled in pressure types of lubricators as shown in certain of the accompanying illustrations.

Mechanical Pressure Lubricators

As stated, pressure lubricators are either of the hand or power type. For the use of the individual car owner or small fleet operator the former is perhaps the most suitable device, due to its ability to operate by means of hand or foot pressure.

Hand Pressure Guns

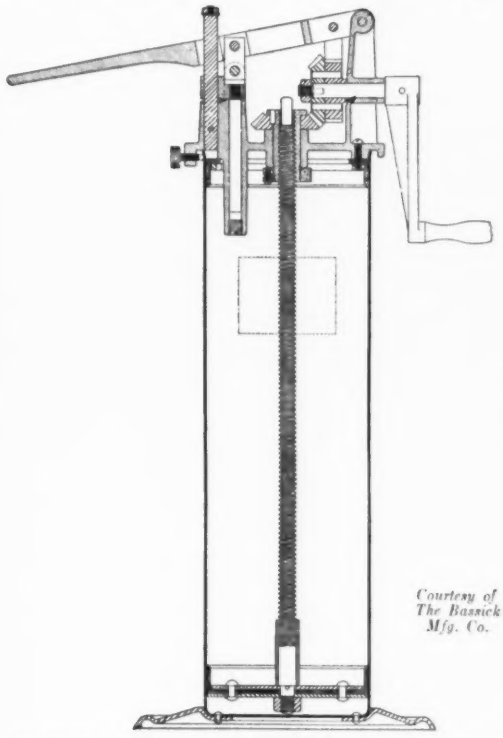
Grease guns of the hand pressure type will usually be capable of developing up to 1000 to 2000 pounds pressure per square inch. They are practicable either with or without hose connections, according to the type of fitting they are designed for, or the location of the part to be lubricated. Pressure can be applied either before or after attachment of the gun to the fitting. The usual method of developing pressure is to force down a suitable plunger by means of a threaded stem which screws into a bushing in the head of



Courtesy of The Bassick Mfg. Co.

Fig. 23—A high pressure service compressor. A is the cap; B, the plunger assembly; C, the barrel; D, the nozzle; E, a soft leather washer; F, the high pressure nozzle unit; G, the handle; H, the high pressure piston; I, a hollow stem; and J, the filling inlet in the hollow stem.

the gun. To the outer end of this stem is attached a handle. According to the design, where pressure is to be developed before attachment of the gun to the fitting, a suitable check valve must be installed in the tip. In such a gun



Courtesy of The Bassick Mfg. Co.

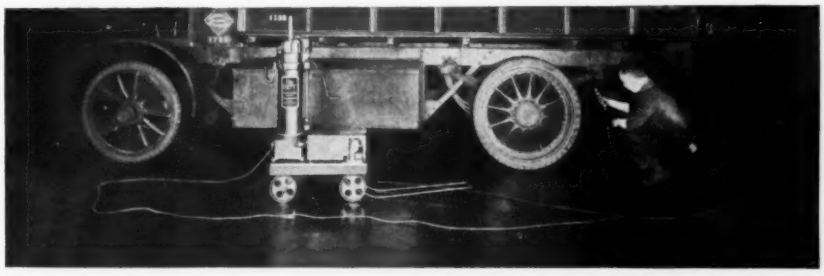
Fig. 24—Constructional details of another type of grease compressor or power lubricator. Operation is brought about by moving lever up and down by hand. Pressure is automatically maintained by a suitable ratchet and mitre gear connection to the plunger. The downward stroke of the lever delivers grease at a pressure of 2,500 pounds per square inch.

the act of attachment opens this valve and automatically permits lubricant to be forced to the bearing. The purpose of designing rigid connection guns with check valves is to eliminate the necessity for relieving the pressure before detaching the gun from the fitting and to enable pressure to be raised before attachment, to overcome the possibility of twisting off the fitting, which might otherwise occur. The direct connection also does away with the possibility of leaks in the flexible hose. These factors are especially important where bearings are to be "started" involving the expulsion of grease which has been allowed to remain too long in the bearings and consequently become gummed, caked and mixed with dirt.

Power Lubricators

In the garage or greasing station, however, the hand pressure gun is more or less supplanted by the portable mechanical or power lubricator of considerably greater grease capacity. In general such lubricators are capable of holding up to 100 pounds of grease. The smaller guns are chiefly of the hand service type, that is, pressure is developed and grease discharged by the operation of a pump handle or lever. A ball or check valve at the base of the pump automatically closes at the end of each stroke to retain all pressure that may have been built up in the gun and hose. To insure efficient operation this check valve must, of course, be kept clean. It should, therefore, be inspected at frequent intervals. In such lubricators pressures of from 2000 to 3000 pounds are readily developed with but little exertion. These pressures are sufficient to effectively handle the usual grades of greases which are applicable to those strictly chassis parts, such as spring shackles and bolts, steering knuckles and rods, mechanical brake connections, etc.

The increasing preference for a specially compounded lubricant of more adhesive and lubricating ability as mentioned heretofore, on such parts as front and rear wheel bearings, universal joints, certain steering gear mechanisms and the clutch will usually require somewhat higher pressure for its effective delivery. Electric and pneumatic compressors have proven to be the most suitable for the handling of such heavier and more viscous greases. Such lubricators are usually of higher capacity than the hand service type, in certain cases holding as much as 100 pounds of lubricants. In this latter capacity a multi-lead discharge manifold is frequently installed to enable the lubrication of a number of points simultaneously. Such compressors can be either electrically driven, or designed to take their air from an adjacent

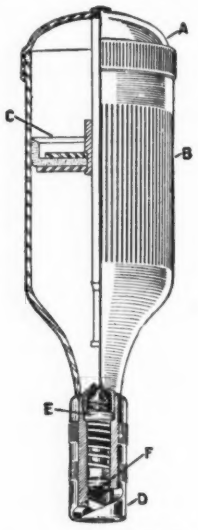


Courtesy of Carr Fastener Co.

Fig. 25—An electric power compressor in service greasing the chassis parts of an electric truck. Note ease with which it can be moved about the garage.

garage compressed air line. In other respects, however, the principles of the power lubricator or compressor are much the same as those involved in the hand service type.

An idea of the speed which may be attained with the full automatic electric compressor is



Courtesy of The Bassick Mfg. Co.

Fig. 26—A "twist-gun" grease lubricator. The act of attaching such a gun to a chassis lubricating fitting generates high pressure and forces lubricant into the bearings. A is the cap; B, the cylinder; C, the follower; D, the coupling; E, a check valve; and F, the valve at the end of the coupling.

gained from the report of a large fleet owner, who recorded the complete lubrication of ten trucks in thirty minutes. This type of equipment may be either stationary or portable, as customers require.

DO NOT OVER-LUBRICATE

In connection with this matter of grease lubrication it is important to remember that there is such a thing as too much. In other words, judicious application is necessary; it is not merely sufficient to zealously wield a grease gun or hose in a promiscuous manner. In many instances, an over-supply of grease may be really detrimental. Besides, it may also result in a direct waste.

Lubricant should in general be forced into a bearing until the old grease therein is expelled. An excellent time to stop is when new grease appears at the outer ends of the bearing. Do not over-do this, however, for not only will it involve waste of good grease, but also, as in the case of the fan bearing, it may cause the fan to slip if grease finds its way onto the belt which will frequently happen.

The steering gear shaft and distributor are other points where an excess of grease may cause trouble. In the case of the former on certain cars, grease will work its way out at the top of the shaft. In the case of the distributor there will be a tendency for the points to become fouled if too much grease is used on the shaft to penetrate into the distributor.

Wheel hubs are still other points where use of an excessive amount of grease may give rise to subsequent trouble, especially if the lubricant lacks adhesiveness, and where front wheel brakes are employed. Here there will be a tendency for the grease to find its way beyond the felt retainers to ultimately come in contact with the brake fabrics, or act as a lubricant between braking surfaces.

CONCLUSION

In the above discussion of chassis lubrication, attention has been given to lubricating equipment in considerable detail. We must remember that lubricating equipment is important inasmuch as it is the ultimate factor in the attainment of efficient lubrication.

It will therefore behoove the owner and operator of any type of automotive vehicle, to study the constructional details of whatever chassis lubricating system he may have to use in connection with the lubrication of his equipment.

A knowledge of such devices, their capabilities, and limitations with regard to handling

Courtesy of The Larkin Automotive Parts Co.

Fig. 27—A high pressure booster designed to open or clear clogged and neglected bearings of used lubricant which would otherwise be resistant to the normal pressure developed by a hand or power compressor. Such a device is claimed to develop a working pressure of 15,000 pounds per square inch.

various grades of oils and greases, will be of marked advantage to him in the selection of lubricants of more nearly the correct density, body or viscosity to function most effectively in his lubricating system and give the most positive and economical lubrication.

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